SQL Constraints

Ensuring Data Integrity in Databases

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What are Constraints?

- Constraints are rules applied to columns in a table.

- They ensure accuracy, validity, and integrity of the data.

Types of Constraints

Primary Key, Foreign Key, Unique, Check, Default, Not Null

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Primary Key

- Uniquely identifies each row in a table.

- Cannot contain NULL values.

- Each table can have only one primary key.

- SQL Example:
  Create table Students (
     StudentID int Primary key,
     Name Varchar(50)
  );

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Foreign Key

- Creates a relationship between two tables.

- Refers to the Primary Key of another table.

- Ensures referential integrity.

- SQL Example:

- Create Table Orders (
  OrderID Int Primary Key,
  StudentID Int,
  Foreign Key (StudentID) Reference Students(StudentID)
  );

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Unique Constraint

- Ensures all values in a column are different.
- Unlike Primary Key, a table can have multiple Unique constraints.

SQL Example:

Create Table Users (
    UserID Int Primary Key,
    Email Varchar(100) Unique
);

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Check Constraint

- Ensures values meet a specific condition.
- Prevents invalid data entry.

SQL Example:

```
Create Table Employees (
   EmpID int Primary Key,
   Age Int Check(Age >= 18)
);
```

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Default Constraint

- Assigns a default value to a column if none is provided.

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  SQL Example:

  Create table Products (
  ProductID Int Primary Key,
  Stock Int Default 100
  );

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Not Null Constraint

- Ensures a column cannot store NULL values.
- Must always have a valid value.

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  SQL Example:

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  Create Table Customers (
     CustomerID Int Primary Key,
     Name varchar(50) Not Null
  );

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Summary

- Primary Key: Unique + Not Null.
- Foreign Key: Links two tables.
- Unique: Prevents duplicate values.
- Check: Applies conditions.
- Default: Assigns default values.
- Not Null: Prevents NULL values.
- Together, constraints maintain data integrity & consistency in SQL databases.

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